

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors:	Fabio Casati, et al.	Examiner:	Kalyan Deshpande
Serial No.:	10/057,143	Group Art Unit:	3623
Filed:	January 25, 2002	Docket No.:	10008149-1
Title:	Exception Analysis, Prediction, and Prevention Method and System		

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is filed in response to the Final Office Action mailed February 11, 2008 and Notice of Appeal filed on May 12, 2008.

AUTHORIZATION TO DEBIT ACCOUNT

It is believed that no extensions of time or fees are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required (including fees for net addition of claims) are hereby authorized to be charged to Hewlett-Packard Development Company's deposit account no. 08-2025.

I. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC" or "Appellants"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

II. RELATED APPEALS AND INTERFERENCES

There are no known related appeals, judicial proceedings, or interferences known to appellant, the appellant's legal representative, or assignee that will directly affect or be directly affected by or have a bearing on the Appeal Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 15 – 26 are pending in the application and stand finally rejected. Claims 1 – 14 were canceled. The rejection of claims 15 – 26 is appealed.

IV. STATUS OF AMENDMENTS

No amendments were made after receipt of the Final Office Action. All amendments have been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The following provides a concise explanation of the subject matter defined in each of the claims involved in the appeal, referring to the specification by page and line number and to the drawings by reference characters, as required by 37 C.F.R.

§ 41.37(c)(1)(v). Each element of the claims is identified by a corresponding reference to the specification and drawings where applicable. Note that the citation to passages in the specification and drawings for each claim element does not imply that the limitations from the specification and drawings should be read into the corresponding claim element or that these are the sole sources in the specification supporting the claim features.

Claim 15

A method for predicting exceptions in a workflow instance comprising:

- preparing data from past workflow executions (During a process data preparation phase, input data is prepared and analyzed, and a data structure is created and populated with process instance execution data: p. 14, lines 1-7. Table 1 shows an example of data from past workflow executions: table begins on p. 19, line 16);
- generating at least one exception prediction model based on the prepared data (A mining phase applies classification algorithms to the data prepared during the process data preparation phase: p. 14, lines 15-16. For example, decision trees are built: p. 22, lines 13-14.);
- using the exception prediction model to generate at least one prediction of an exception before the exception occurs for a current instance of the workflow instance (Exception prediction involves predicting the occurrence of exceptions as early as possible during the process execution so the exceptions can be prevented: p. 10, lines 18-19 and p. 28, lines 11-14. An interpretation phase identifies problems and inefficiencies that can be addressed and removed: p. 14, lines 17-19.); and
- performing an action during execution of the workflow instance to avoid occurrence of the exception in the workflow instance (An exception prevention unit performs exception prevention that involves taking actions to avoid exceptions or to other mitigate the consequences of the exception. For example, when a determination is made

that a workflow has a high probability of not meeting a deadline, the exception prevention unit assigns more resources to the workflow: p. 27, lines 10-15).

Claim 23

A method of predicting exceptions in a workflow process, comprising:

analyzing data during execution of a workflow process to generate classification rules for plural stages of the workflow process (A mining phase applies classification algorithms to the data prepared during the process data preparation phase: p. 14, lines 15-16. For example, decision trees are built: p. 22, lines 13-14. An exception analysis unit includes a data mining tool that generates classification rules based on training and validation sets: p. 15, lines 7-9.);

generating prediction rules for the plural stages to generate a probability of an exception in the workflow process (Exception prediction involves predicting the occurrence of exceptions as early as possible during the process execution so the exceptions can be prevented: p. 10, lines 18-19 and p. 28, lines 11-14. For example, when the exception processing mechanism predicts that a process instance has a very high probability of missing its deadline, the exception processing mechanism raises the process instance priority to an appropriate priority level: p. 6, lines 19-22. Leaf nodes in the decision tree contain a probability that an examined instance is an exception: p. 26, lines 23-24.); and

when the probability exceeds a threshold, then performing an action during execution of the workflow process to avoid the exception (An exception prevention unit performs exception prevention that involves taking actions to avoid exceptions or to other mitigate the consequences of the exception. For example, when a determination is made that a workflow has a high probability of not meeting a deadline, the exception prevention unit assigns more resources to the workflow: p. 27, lines 10-15).

Claim 26

The method of claim 15 further comprising, refining the at least one prediction as process execution of the workflow instance proceeds (The exception processing mechanism dynamically predicts the occurrence of exceptions at process instantiation

time and progressively refines the prediction as process execution proceeds and more information become available: p. 6, lines 13-15.).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 21-22 are rejected under 35 USC § 112, first paragraph, as failing to comply with the enablement requirement.

Claims 15-26 are rejected under 35 USC § 102(b) as being anticipated by “Specification and Implementation of Exceptions in Workflow Management Systems” (Casati).

VII. ARGUMENT

The rejection of claims 15 – 26 is improper, and Appellants respectfully request reversal of these rejections.

The claims do not stand or fall together. Instead, Appellants present separate arguments for various claims. Each of these arguments is separately argued below and presented with separate headings and sub-heading as required by 37 C.F.R. § 41.37(c)(1)(vii).

Claim Rejections: 35 USC § 112

Claims 21-22 are rejected under 35 USC § 112, first paragraph, as failing to comply with the enablement requirement. Specifically, the Examiner argues that word “selectively” in claim 21 is not defined in the specification and fails to guide a user how to selectively decide whether to remove a data value or not. Appellants respectfully traverse.

First, the word “selectively” appeared in the original claim 21. **Original claims filed in an application form part of the specification.** Thus, support for the term “selectively” is found in the language of the originally filed claims.

Second, Appellants note that the purpose of the written description requirement of 35 U.S.C. § 112, first paragraph, is to ensure that the inventor had *possession*, as of the filing date of application relied upon, of the specific subject matter later claimed by him. This possession requirement ensures that the applicant actually invented the claimed subject matter at the time the patent application was filed. As has been repeatedly stated by both the Court of Customs and Patent Appeals and the Federal Circuit:

[A]ll that is required is that it [the applicant] *reasonably conveyed* to persons skilled in the art that, as of the filing date thereof, the inventor had *possession* of the subject matter later claimed by him (see *Eiselstein*, 52 F.3d at 1039, 34 USPQ2d 1467, 1470 (emphasis added)).

The original specification clearly supports selectively removing data to refine the classification rules. In fact, the original specification even discusses examples:

In particular, the mining phase may generate classification rules that classify process instances based on attributes that are not interesting in the specific case being considered. For example, when an obvious and not interesting correlation is generated, an analyst may want to repeat the mining phase and selectively remove one or more attributes from the ones considered in generating the classification rules, so that the classifier can focus on more meaningful attributes. (See p. 14, lines 22-28).

As yet another example, Appellants respectfully ask the Board of Appeals to review Figure 4 and read the specification at p. 16, lines 13-25. This section discusses in detail generating classification rules and then modifying them by removing input data.

For at least these reasons, Appellants respectfully ask the Board of Appeals to reverse this rejection.

Claim Rejections: 35 USC § 102(b)

Claims 15-26 are rejected under 35 USC § 102(b) as being anticipated by “Specification and Implementation of Exceptions in Workflow Management Systems” (Casati). These rejections are traversed.

A proper rejection of a claim under 35 U.S.C. §102 requires that a single prior art reference disclose each element of the claim. See MPEP § 2131, also, *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983). Since Casati does not teach each element in the claims, these claims are allowable over Casati.

Sub-Heading: Claims 15-22

Independent claim 15 recites elements that are not taught or suggested in Casati. By way of example, claim 15 recites predicting exceptions before the exception occurs and performing an action during execution of the workflow to avoid occurrence of the exception in the workflow.

By contrast, Casati discloses an exception handler that reacts to exceptions after the exceptions occur. In other words, once an exception occurs, the exception handler in Casati reacts to the exception:

The exception-handling mechanism must be able to *capture* exceptional events and to *react* to them. Each reaction must first assess the state of the process and then, in a few cases, adopt the corrective action; in many cases events correspond to false alarms and do not need to be followed by a corrective action. (See Casati at p. 407, lines 3-7).

Casati clearly states that his exception handler is triggered or activated once an exception occurs. After the exception is detected, actions are initiated to respond to the exception (“The action describes the updates and procedures that must be invoked to respond to the exception occurrence.” See Casati at p. 407, lines 25-26).

Nowhere does Casati teach predicting exceptions before they occur or performing actions to avoid predicted exceptions before they occur. In fact, Casati teaches away from predicting exceptions. Specifically, Casati discusses a type of exception known as “expected exceptions” (i.e., anomalies that are known in advance to the workflow designer). Casati explains that expected exceptions cannot be predicted:

Expected exceptions are unpredictable, and therefore cannot be conveniently represented in the process in the form of special tasks and connections among tasks. (See Casati at p. 406, third paragraph, lines 4-6).

Casati repeatedly states that exceptions cannot be predicted. For example, on page 411, Casati provides examples of typical exceptions that occur in the car rental process. Casati then explains:

Such situations cannot be efficiently modeled and handled within the flow structure, since they are asynchronous and their occurrence is not related to the completion of other tasks in the case. (See Casati at p. 411).

Thus, a large difference exists between the claims and Casati. The claims are directed to “predicting” exceptions before they occur, whereas Casati is directed to “handling” exceptions after they have already occurred.

Appellants respectfully state that anticipation is established only when a single prior art reference discloses each and every element of a claimed invention united in the same way. RCA Corp. v. Applied Digital Data Systems, Inc., 730 F.2d 1440, 1444 (Fed. Cir. 1984).

Casati does not teach or even suggest predicting exceptions. For at least these reasons, independent claim 15 and its dependent claims are allowable over Casati.

Response to Examiner Arguments

In the final office action, the examiner argues as follows:

Thus, although Casati focuses on handling exceptions after their occurrence, Casati also deals with prediction the occurrences of the exception and mapping processes to handle the exception. By handling the exception, Casati is effectively avoiding the exception (see final office action mailed 02/11/2008 at p. 3).

Handling exceptions after they occur is quite different than predicting exceptions before they occur. Further, the following statement by the examiner is simply not true: “By handling the exception, Casati is effectively avoiding the exception.” In Casati, the exceptions are not avoided. By complete contrast, Casati handles or addresses exceptions

after their occurrence, not before their occurrence. An exception can occur and subsequently be addressed. At the same time, this exception that occurred was not first predicted before its occurrence.

Sub-Heading: Claims 23-25

Independent claim 23 recites elements that are not taught or suggested in Casati. By way of example, claim 23 recites generating a probability of an exception occurring in a workflow process. When the probability exceeds a threshold, claim 23 recite performing an action during execution of the workflow process to avoid the exception.

By contrast, Casati discloses an exception handler that reacts to exceptions **after** the exceptions occur (not during execution of the workflow process). In other words, once an exception occurs, the exception handler in Casati reacts to the exception:

The exception-handling mechanism must be able to *capture* exceptional events and to *react* to them. Each reaction must first assess the state of the process and then, in a few cases, adopt the corrective action; in many cases events correspond to false alarms and do not need to be followed by a corrective action. (See Casati at p. 407, lines 3-7).

Casati clearly states that his exception handler is triggered or activated once an exception occurs. After the exception is detected, actions are initiated to respond to the exception (“The action describes the updates and procedures that must be invoked to respond to the exception occurrence.” See Casati at p. 407, lines 25-26).

Nowhere does Casati teach a method of predicting exceptions or performing actions during execution of a workflow process to avoid the predicted exceptions. In fact, Casati teaches away from predicting exceptions. Specifically, Casati discusses a type of exception known as “expected exceptions” (i.e., anomalies that are known in advance to the workflow designer). Casati explains that expected exceptions cannot be predicted:

Expected exceptions are unpredictable, and therefore cannot be conveniently represented in the process in the form of special tasks and connections among tasks. (See Casati at p. 406, third paragraph, lines 4-6).

Casati repeatedly states that exceptions cannot be predicted. For example, on page 411, Casati provides examples of typical exceptions that occur in the car rental process. Casati then explains:

Such situations cannot be efficiently modeled and handled within the flow structure, since they are asynchronous and their occurrence is not related to the completion of other tasks in the case. (See Casati at p. 411).

Thus, a large difference exists between the claims and Casati. The claims are directed to “predicting” exceptions and performing actions during execution of the workflow to avoid the exception, whereas Casati is directed to “handling” exceptions after they have already occurred.

Appellants respectfully state that anticipation is established only when a single prior art reference discloses each and every element of a claimed invention united in the same way. RCA Corp. v. Applied Digital Data Systems, Inc., 730 F.2d 1440, 1444 (Fed. Cir. 1984).

Casati does not teach or even suggest predicting exceptions. For at least these reasons, independent claim 23 and its dependent claims are allowable over Casati.

Sub-Heading: Claim 26

Claim 26 recites refining the at least one prediction as process execution of the workflow instance proceeds. For example, an exception processing mechanism dynamically predicts the occurrence of exceptions at process instantiation time and progressively refines the prediction as process execution proceeds and more information become available (see specification at p. 6, lines 13-15). Casati does not teach this element.

The examiner argues that p. 424 of Casati teaches that rules are adjusted based on execution of the workflow. Adjusting rules is quite different than refining a prediction as recited in claim 26. In Casati at p. 424, workflow events are managed by the time manager. Nowhere, however, does Casati expressly teach that a “prediction” is refined as process execution of the workflow instance proceeds.

CONCLUSION

In view of the above, Appellants respectfully request the Board of Appeals to reverse the Examiner's rejection of all pending claims.

Any inquiry regarding this Amendment and Response should be directed to Philip S. Lyren at Telephone No. 832-236-5529. In addition, all correspondence should continue to be directed to the following address:

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VIII. Claims Appendix

1. – 14. (canceled)

15. A method for predicting exceptions in a workflow instance comprising:

preparing data from past workflow executions;
generating at least one exception prediction model based on the prepared data;
using the exception prediction model to generate at least one prediction of an exception before the exception occurs for a current instance of the workflow instance;
and
performing an action during execution of the workflow instance to avoid occurrence of the exception in the workflow instance.

16. The method of claim 15 wherein exception prediction includes the steps of

building a process analysis table for a process definition of interest;
adding labeling information to the process analysis table; and
generating classification rules by employing data mining techniques.

17. The method of claim 15 wherein classification rules are generated for each stage in a process and are stored in a repository.

18. The method of claim 17 wherein at least one classification rule set generated for a process execution stage is executed to make predictions on at least one running process instance.

19. The method of claim 18 wherein at least one prediction is stored in a repository;
wherein the prediction stored in the repository includes the exception being predicted and
an indication of an accuracy of the prediction.

20. The method of claim 15 wherein the at least one prediction is reported to a workflow
management system (WfMS) so that the WfMS alters execution of processes to try to
avoid the exception.

21. The method of claim 15 further comprising:

- reporting classification rules to a user;
- selectively removing input data to refine the classification rules; and
- re-generating the classification rules by employing data mining techniques.

22. The method of claim 21 wherein when the classification rules are satisfactory to the
user, storing the classification rules in a database.

23. A method of predicting exceptions in a workflow process, comprising:

- analyzing data during execution of a workflow process to generate classification
rules for plural stages of the workflow process;

- generating prediction rules for the plural stages to generate a probability of an
exception in the workflow process; and

- when the probability exceeds a threshold, then performing an action during
execution of the workflow process to avoid the exception.

24. The method of claim 23 further comprising: constructing a process analysis table for each of the plural stages to generate the classification rules.

25. The method of claim 23 further comprising: using data mining techniques to generate the classification rules.

26. The method of claim 15 further comprising, refining the at least one prediction as process execution of the workflow instance proceeds.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.